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MONOGRAPHIC STUDIES IN THE GENUS *ELEOCHARIS*—V¹

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(Plates 537–547)

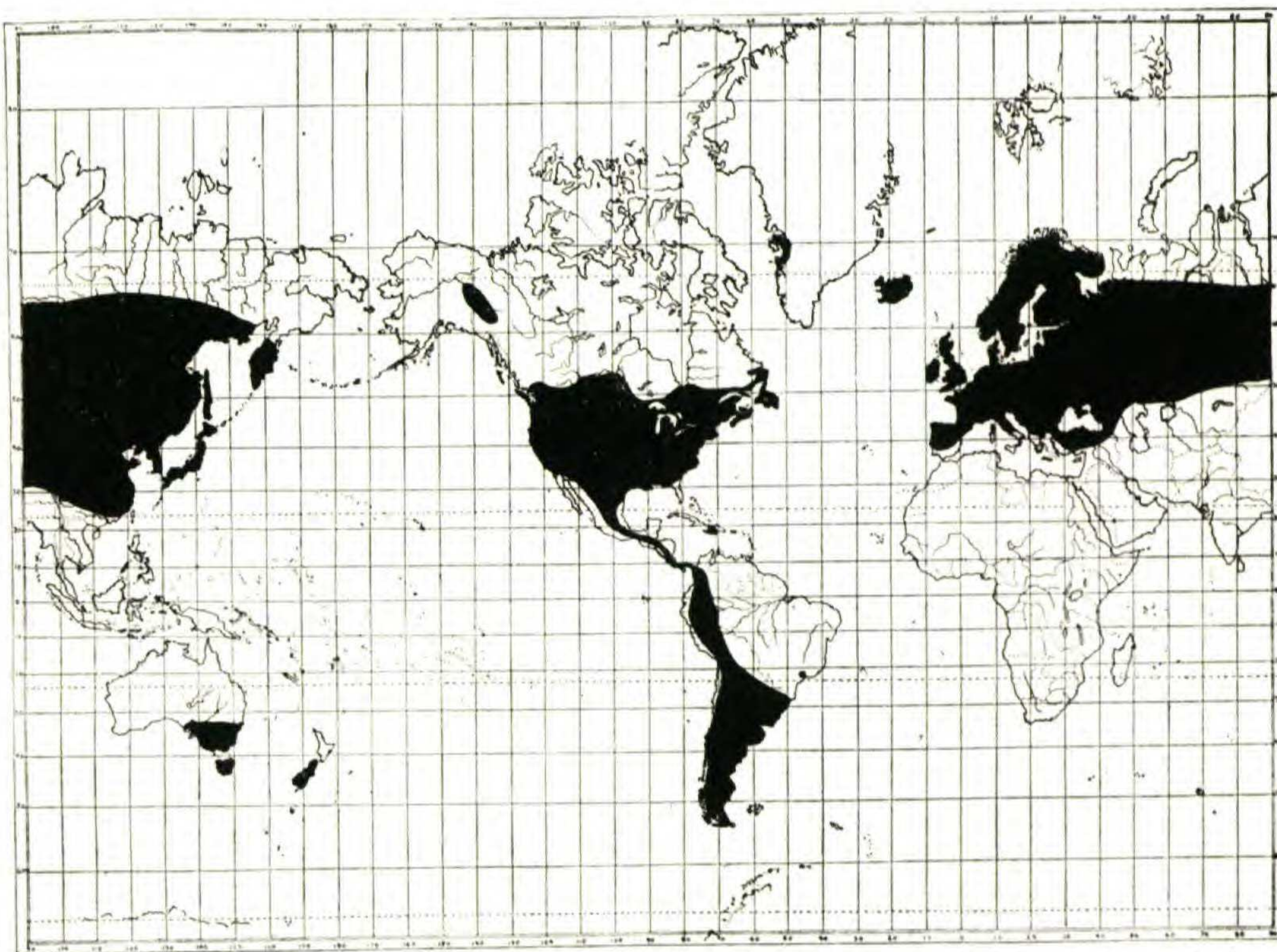
THIS paper, concluding the purely taxonomic treatment of *Eleocharis*, includes species not previously or adequately discussed, together with illustrations, distributional maps, and indexes to all species.

Since my initial treatment of the genus, I have seen most of the additional large collections of *Eleocharis* in this country, and during two visits to Europe, I was able to find many of the types which could not otherwise be interpreted. To all who have lent me material for study and to those who have given me access to collections, I offer my deep appreciation.

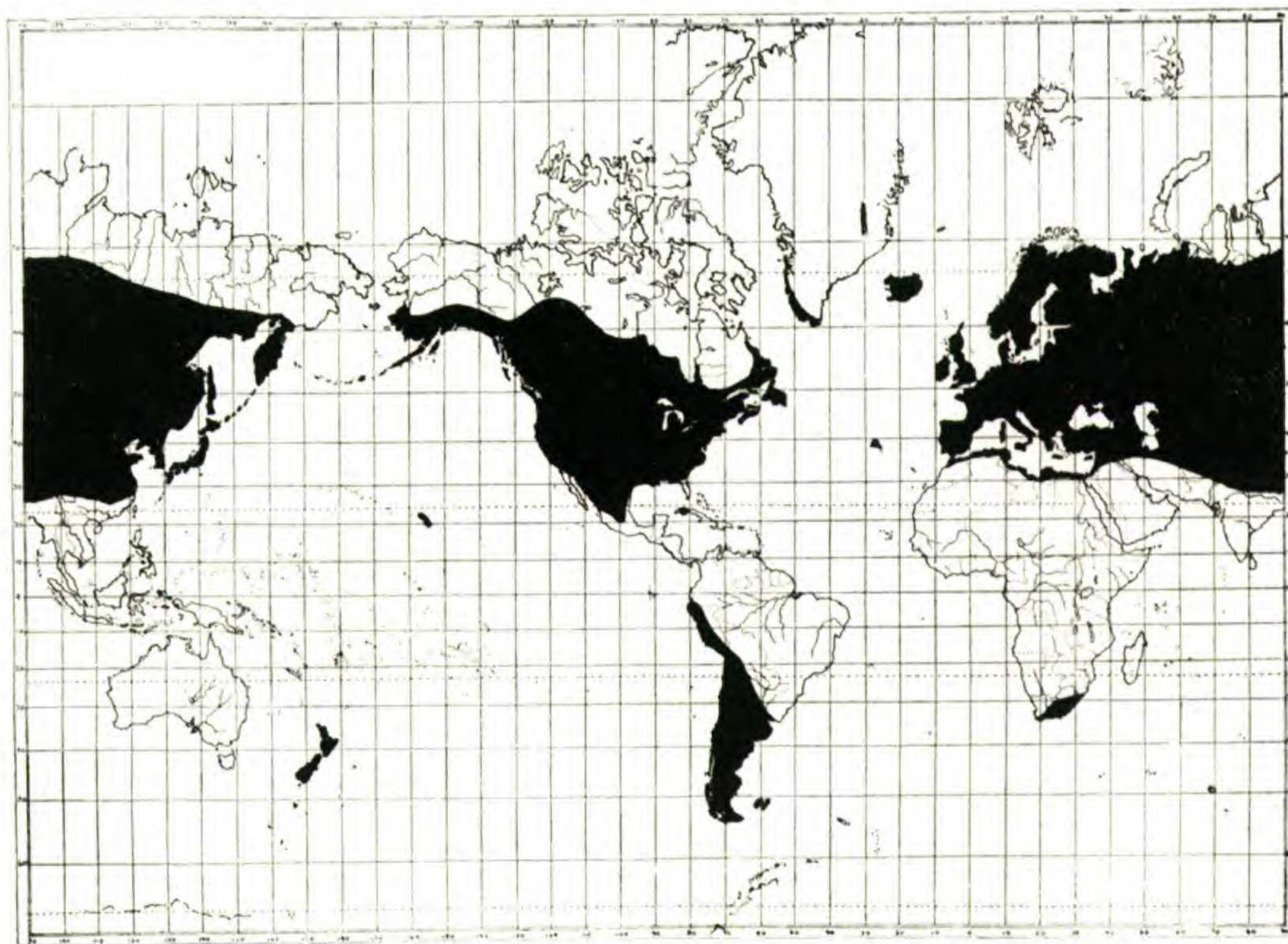
To the groups into which the genus has been divided (RHODORA xxxi. 127–129 (1929), the old-world *Multicaules* have been added; the incongruous series *Intermediae*, *Melanocarpeae* and *Tuberculosae* have been eliminated.

As to the relationships of *Eleocharis*, little can be said here. It is a "natural" genus, probably most closely allied to *Fimbristylis*, as Chermeson has pointed out. From species of *Scirpus* (i.e. *S. cespitosus*, *S. pumilus*, *S. planifolius*, etc.) there is a marked cleavage in the texture of the achene and especially in the type of cellular reticulation, the most important single character for determination of species in *Eleocharis*. As discussed under the *Palustres*, the relative width or constriction of the tubercle, the nature of the sheath-apex, or the

¹ Brooklyn Botanic Garden Contributions no. 85. The cost of plates and maps is met by the Brooklyn Botanic Garden.



MAP 1. Range of ELEOCHARIS, series ACICULARES.



MAP 2. Range of ELEOCHARIS, subseries PALUSTRES.

uniglumate condition of the lowest scale are not always dependable characters.

ELEOCHARIS: CONSPECTUS OF THE GENUS

Series 1. MUTATAE.

1, *E. fistulosa*. 2, *E. nupeensis*. 3, *E. quadrangulata*. 4, *E. mutata*. 5, *E. cellulosa*. 6, *E. variegata*. 7, *E. laxiflora*. 8, *E. nuda*. 9, *E. calocarpa*. 10, *E. spiralis*. 11, *E. interstincta*. 12, *E. equisetoides*. 13, *E. dulcis*. 14, *E. sphacelata*. 15, *E. Robbinsii*. 16, *E. elongata*. 17, *E. mitrata*. 18, *E. Jelskiana*. 19, *E. plicarhachis*.

Series 2. PAUCIFLORAE.

20, *E. pauciflora*. 21, *E. macrantha*. 22, *E. margaritacea*. 23, *E. parvula*. 24, *E. rostellata*. 25, *E. melanomphala*.

Series 3. ACICULARES.

26, *E. exigua*. 27, *E. radicans*. 28, *E. bonariensis*. 29, *E. stenocarpa*. 30, *E. nervata*. 31, *E. brachycarpa*. 32, *E. cancellata*. 33, *E. bella*. 34, *E. Reverchonii*. 35, *E. Wolfii*. 36, *E. acicularis*. 37, *E. pusilla*.

Series 4. OVATAE.

38, *E. obtusa*. 39, *E. ovata*. 40, *E. Engelmanni*. 41, *E. lanceolata*.

Series 5. MACULOSAE.

42, *E. maculosa*. 43, *E. fuscopurpurea*. 44, *E. debilis*. 45, *E. bahamensis*. 46, *E. atropurpurea*. 47, *E. capillacea*. 48, *E. Sellowiana*. 49, *E. Schaffneri*. 50, *E. olivacea*. 51, *E. flavescens*. 52, *E. Sintenisii*. 53, *E. geniculata*. 54, *E. minuta*. 55, *E. intricata*.

Series 6. PALUSTRIFORMES.

Sub-series: PALUSTRES.

56, *E. palustris*. 57, *E. mamillata*. 58, *E. macrostachya*. 59, *E. neozeylandica*. 60, *E. melanostachys*. 61, *E. Dregeana*. 62, *E. mitracarpa*. 63, *E. Savatieri*. 64, *E. calva*. 65, *E. Smallii*. 66, *E. ambigens*. 67, *E. halophila*. 68, *E. uniglumis*. 69, *E. kamtschatica*.

Sub-series: TRUNCATAE (North American).

70, *E. elliptica*. 71, *E. tenuis*. 72, *E. compressa*. 73, *E. nitida*. 74, *E. acutisquamata*. 75, *E. tricostata*. 75a, *E. cylindrica*. 76, *E. Bolanderi*. 77, *E. Palmeri*. 78, *E. decumbens*. 79, *E. Parishii*. 80, *E. intermedia*. 81, *E. Macounii*.

Sub-series: TRUNCATAE (chiefly South American).

82, *E. Dombeyana*. 83, *E. crinalis*. 84, *E. Rabenii*. 85, *E. albibracteata*. 86, *E. montevidensis*. 87, *E. nodulosa*. 88, *E. Parodii*. 89, *E. elegans*. 89a, *E. densa*. 90, *E. Lechleri*. 91, *E. mendocina*. 92, *E. Spegazzinii*. 93, *E. Haumaniana*.

Series 7. TENUISSIMAE.

94, *E. minima*. 95, *E. urceolata*. 96, *E. Barrosii*. 97, *E. nana*. 98, *E. amazonica*. 99, *E. oligantha*. 100, *E. nigrescens*. 101, *E. subcancellata*. 102, *E. microcarpa*. 103, *E. retroflexa*. 104, *E. glauca*. 105, *E. alveolata*. 106, *E. Baldwinii*. 107, *E. vivipara*. 108, *E. subfoliata*. 109, *E. grisea*. 110, *E. minutissima*. 111, *E. tortilis*. 112, *E. tuberculosa*. 113, *E.*

Chaetaria. 114, *E. Brainii*. 115, *E. Schweinfurthiana*. 116, *E. caespitosissima*. 117, *E. anceps*. 118, *E. trilophus*. 119, *E. Naumanniana*.

Series 8. SULCATAE.

120, *E. nudipes*. 121, *E. pachystyla*. 122, *E. quinquangularis*. 123, *E. filiculmis*. 124, *E. glauco-virens*. 125, *E. Loefgreniana*. 126, *E. dunensis*. 127, *E. viridans*. 128, *E. pachycarpa*.

Series 9. MULTICAULES. Old-world species, with 3-fid styles (except *E. carniolica*); usually with coarse culms. Spikelets frequently proliferous.

129, *E. multicaulis*. 130, *E. marginulata*. 131, *E. limosa*. 132, *E. Baroni*. 133, *E. carniolica*. 134, *E. tetraquetra*. 135, *E. laeviseta*. 136, *E. pellucida*. 137, *E. congesta*. 138, *E. cylindrostachys*. 139, *E. acuta*. 140, *E. Dietrichiana*. 141, *E. Cunninghamii*.

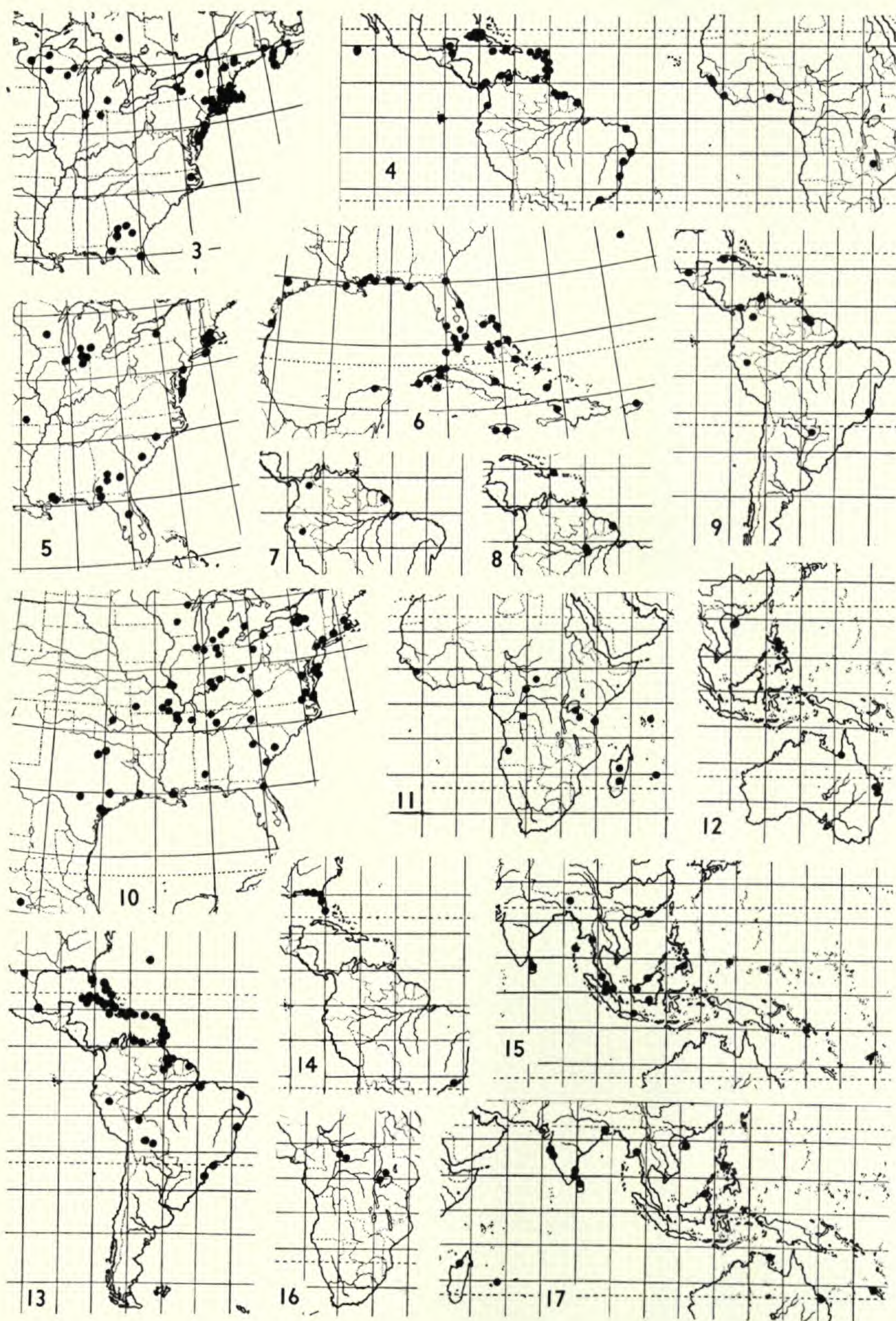
Species of uncertain classification.

142, *E. minarum*. 143, *E. melanocarpa*. 144, *E. albida*. 145, *E. squamigera*. 146, *E. subarticulata*.

Series 1: MUTATAE

1. *E. FISTULOSA* (Poir.) Link [MAP 28]; Svenson, RHODORA xxxi. 152 (1929); Brain, Proc. Rhodesia Sci. Assoc. xxxiii. 84, pl. x, fig. 7 (1934); Hutchinson & Dalziel, Fl. West Trop. Afr. ii. 468 (1936). *Scirpus fistulosus* Poir. (1804), not Forskål (1775).¹ *S. angulatus* Willd. ex Kunth, Enum. ii. 155 (1837) (in synonymy). *E. planiculmis* Steud. Syn. Cyp. 80 (1855). Additional citations: CUBA: Hatuey, Santa Clara, León no. 9215 (NY). MEXICO: (sine loc.) *F. Mueller* no. 1367 (NY). GUATEMALA: Puerto Barrios, Dept. Izabal, Standley no. 25150 (NY). PANAMA: Chiriqui, El Bouquete, 1200 m., Killip no. 4569 (NY); Chepo, prov. Panama, Pittier no. 4557. COLOMBIA: Popayan, Dept. El Cauca, Pennell & Killip no. 8241. ECUADOR: San Cristobal, Galapagos Ids., Schimpff no. 113 (NY) (scales purplish). BOLIVIA: Apolo, 4800 ft. R. S. Williams no. 916 (NY); Sara, Dept. Santa Cruz, Steinbach no. 7444 (NY). PARAGUAY: Villa Rica, Joergensen no. 4497 (NY) and Morong nos. 298 (NY), 499 (NY). ARGENTINA: Misiones, Ekman no. 1295 (NY); Tucuman, Venturi no. 8485 (US, B). BRAZIL: Bahia, Salzmann, hb. Lindley (TYPE of *Limnochloa obtuse-trigona*); Caldas, Minas Geraes, Regnell II no. 1309 (S); S. José, Matto Grosso, Lindman no. A2663 (S); Porto Alegre, Rio Grande do Sul, Malme no. 446 (S). AFRICA: TANGANYIKA: Manyoni Dist., 4200 ft., Burt no. 3673 (K) (var. *robusta*) (culms bright yellow-green; scales brown-margined; basal sheaths dark reddish-brown; bristles short, smooth); Bukoba, 3700 ft., Haarer no. 2078 (K); Nyakato, Bukoba Dist., Haarer no. 2121 (K). ANGLO-EGYPTIAN SUDAN: Meshra el Rak, N. D. Simpson no. 7650 (K). BELGIAN CONGO: Kabinda, 6° S. 24° E., Becquaert no. 62 (G). SENEGAMBIA: Casamanca, Chevalier no. 2432 (K); nw. coast, Hendelot no. 320 (K). SIERRA

¹ The earlier homonym does not prevent the name *Scirpus fistulosus* Poir. from being used in *Eleocharis* [cf. *E. intermedia* (Muhl.) R. & S. p. [56]].



MAPS 3-17. Map of *ELEOCHARIS*, 3, *ROBBINSII*; 4, *MUTATA*; 5, *EQUISE-TOIDES*; 6, *CELLULOSA*; 7, *JELSKIANA*; 8, *MITRATA*; 9, *PLICARHACHIS*; 10, *QUADRANGULATA*; 11, *VARIEGATA*; 12, *NUDA*; 13, *INTERSTINCTA*; 14, *ELONGATA*; 15, *LAXIFLORA*; 16, *CALOCARPA*; 17, *SPIRALIS*.

LEONE: Erimakuna, *Elliott* no. 4453 (K); Romietta, *Thomas* no. 5605 (K); sine loc., *Dighton* no. 339 (K); *Thomas* no. 5296 (K). CAMEROON: Buar, 6° N. 15° E., alt. 900–1000 m., *Mildbraed*, no. 9402 (K). RHODESIA: Salisbury, 4800 ft., *Eyles* no. 4742 (K) (culms light green; scales colored). MADAGASCAR: *Perrier de la Bâthie* no. 17929 (B) (scales more obtuse than usual; achenes as in Clarke's illustration); Ankazobé, *P. de la Bâthie* no. 2722 (B) (scales purple-tinged); *Parker* in 1880 (K), in part; *Petit-Thouars* (Berlin, *Willd.* no. 1196). INDO-CHINA: Annam, Mt. Bani, *J. & M. S. Clemens* no. 4050 (NY) (as *E. variegata*). JAPAN: cf. *Tokio Bot. Mag.* xviii. 110 (1904). JAVA: *Zollinger* no. 284 (Paris, TYPE of *E. planiculmis*); *Blume* (NY). PHILIPPINE ISLANDS: Manila, *Merrill* no. 9790 (NY); Tanculan, Mindanao, *Bur.-Science* no. 26116 (NY). BORNEO: *Beccari* no. 853 (K). INDIA: Peninsula Ind. Or., hb. *Wight* nos. 1902 (NY), 3154 (NY), and *Wallich Cat.* no. 3453B (NY); Upper Gangetic Plain, *Thomson* (NY). EAST BENGAL: *Griffith* no. 6235 (NY). BRITISH NEW GUINEA: Dagwa, Oriomo River, Western Division, *Brass* no. 6010 (NY). AUSTRALIA: Cairns, Cook District, *S. T. Blake* no. 9371 (B); Mouton Bay, *Mueller* (Br. Mus.).

Though the achene-body in oriental specimens averages 1.5 mm. long, as in American material, *Wight* no. 3154 (NY) has the achene-body 2.0 mm. long, with linear surface-markings resembling those of *E. laxiflora*, exactly as in Clarke's illustration (t. xxxv, fig. 4). In the enormous Bolivian specimens of *Steinbach* no. 7444 the achene-body is also 2 mm. long. In *Harris* no. 8513 (Jamaica) the bristles are perfectly smooth.

2. *E. NUPEENSIS* Hutchinson & Dalziel, *Fl. West Trop. Afr.* ii. 467 (1936). Similar to *E. fistulosa*. I believe the following are synonyms: *E. fistulosa* var. *robusta* Boeckl. *Flora* lxii. 563 (1876); Svenson, *RHODORA* xxxi. 153, pl. 188, fig. 13 (1929). *E. mitrata* var. *africana* C. B. Clarke in Thistleton-Dyer, *Fl. Trop. Afr.* viii. 406 (1902) and Durand & Schinz, *Consp. Fl. Afr.* v. 599 (1895) (nomen). *E. fistulosa* var. *micrantha* Chermezon, *Archiv. Bot. Caen.* vii. Mém. no. 4: 25 (1936).—The TYPE (*Barter* no. 1040 (K) from Nupe, northern Nigeria), has grayish achenes 2 mm. long, with brown-rimmed horizontal cells, and spikelets much more slender than in *E. fistulosa*. Judging from description, *E. fistulosa* var. *micrantha* (from Pont du Gendarme near Saint Louis, Senegal), is the same as *E. nupeensis*.

E. nupeensis, *E. fistulosa*, *E. mutata*, *E. variegata*, and *E. calocarpa* show great complexity in tropical Africa, and distinction between species is not yet wholly satisfactory.

3. *E. QUADRANGULATA* (Michx.) R. & S. [MAP 10]; Svenson, *RHODORA* xxxi. 132 (1929).—Noteworthy range extensions: NEW YORK: Panther Lake, Oswego Co., *House* no. 20112 (Alb); Long Pond, North Salem,

Westchester Co., *Dr. Meade* (Alb); Lake Mahtowantah, Fulton, Oswego Co., *Coville* no. 16 (Alb). WEST VIRGINIA: Shawnee Lake, Mercer Co., *Core* in 1929 (W Va, Duke). NORTH CAROLINA: Hendersonville, *Blomquist* no. 5572 (Duke). GEORGIA: Augusta, *Hildebrand* in 1923 (Duke). INDIANA: Lake Everett, Allen Co., *Deam* no. 20819 (D); Fredonia, Crawford Co., *Deam* no. 27306 (D); Corydon, Harrison Co., *Deam* no. 20517 (D); Bass Lake, Starke Co., *Deam* no. 54251 (D, B); Adams Lake, Lagrange Co., *Deam* nos. 54104 (D, B), 55356 (D, B); Madison, Jefferson Co., *E. Banta* in 1934 (D, B). LOUISIANA: marsh near Orange, Texas, *Munz* no. 1456 (Pomona). ILLINOIS: St. Clair Co., *Brendel* (Ill); Wolf Lake, *E. J. Hill* no. 90 (Ill); Mascoutah, *Welch* in 1862–1870 (Ill). WISCONSIN: Crooked Lake, Oxford, Adams Co., *Fassett & Hotchkiss* no. 14396 (B); Shewano Lake, Shewano Co., *Hotchkiss & Koehler* no. 4311 (B). MEXICO: Atequiza, Jalisco, *Pringle* no. 3473 (B) (scales strongly purple-margined).

Professor Fernald (RHODORA xxxvii. 393 (1935)) has distinguished the coarser plants characteristic of the northern range as var. *crassior*. Having collected the smaller variety in shallow ponds choked by other aquatic vegetation and the larger form in open deep ponds northward, I suspect that opportunity for growth with little competition is an important factor in determining size.

4. *E. MUTATA* (L.) R. & S. [MAP 4], Svenson, RHODORA xxxi. 133 (1929); Hutchinson & Dalziel, Fl. West Trop. Afr. ii. 467 (1936). MEXICO: Lake Chichencanab, Quintana Roo, *Swallen* no. 2769 (US). REVILLAGIGEDO IDS.: Clarion I., *Howell* 8357 (Cal). BRITISH HONDURAS: Sibun R., *Gentle* nos. 1429, 1432 (Cath. Univ.). ECUADOR: Puna Island, *Andersson* in 1852 (S, as *E. scariosa*). BRAZIL: Sebastopolis, *Martius* no. 229 (NY); Ceará, *Drouet* no. 2503 (B); Rio de Janeiro, *Glaziou* no. 9337 (NY). AFRICA: LIBERIA: Monrovia, *Massey* no. 82 (NY). SIERRA LEONE: Mambolo, *Deighton* no. 978 (K); Bagroo River, *Mann* no. 93 (K); frequent in patches in tidal swamps, withstands considerable brackishness, *Glanville* no. 211 (K). NIGERIA: salt water swamp, Lagos Island, *Barter* no. 2234 (K); Lagos, *MacGregor* no. 327 (K). BRITISH EAST AFRICA: Pemba, *Greenway* no. 2730 (K).

5. *E. CELLULOSA* Torr. [MAP 6]; Svenson, RHODORA xxxi. 152 (1929).

Occasional specimens with angled culms appear very close to *E. mutata*. A few specimens have bristles with traces of teeth; in *Britton, Britton & Brown* no. 6636 from Condado, Porto Rico, the bristles are strongly barbed. The glossy achene of *E. cellulosa* has much larger surface cells than the rough dull achene of *E. mutata*, and the scales are frequently reddish. With a single exception (*C. Wright*, Rutersville, Texas), all specimens are from brackish coastal areas.

6. *E. VARIEGATA* (Poir.) Presl [PL. 537, FIG. 4; MAP 11]. Culms stout (3 mm. wide), cylindric, often twisted, and sometimes trigonous below the inflorescence; spikelets lanceolate-cylindric, 1.5–2.5 cm. long, 3–4 mm. wide; scales *not appressed*, ovate, blunt, striate, convex, semi-glutinous, *yellow with ferruginous margins, the lacerate apex broadly hyaline*; stamens 3; style 3-fid (or 2-fid); achene obovate, biconvex, 2.0–2.5 mm. long, stramineous, with about 15 rows of inflated horizontally-elongated to isodiametric cells; style-base dark brown, flattened, 0.5 mm. long; bristles brown, equalling or exceeding the achene or frequently wanting.—SVENSON, RHODORA xxxi. 156 (1929); Brain, Proc. Rhodesia Sci. Assoc. xxxiii. 84, pl. x, fig. 10 (1934); Chermezon, Arch. Bot. Caen iv, no. 7:40 (1931); Hutchinson & Dalziel, Fl. Trop. West Afr. ii. 84 (1936).—MADAGASCAR: massif de l'Andringitra, 2000 m., *Perrier de la Bâthie* no. 14567 (B); *Blackburn* (K); *Petit-Thouars* (Berlin, hb. Willd.). MAURITIUS: *Sieber* no. 19 (NY); *R. E. Vaughan* no. B2 (K). SEYCHELLES: Maké, *Thomasset* (K) (differs from *Sieber* no. 19 in heavier, longer bristles and closer reticulation of achene). BELGIAN CONGO: Wombali, *Vanderyst* nos. 4263, 4243 (K) (similar to Madagascar plant but lacks bristles). TANGANYIKA: Arusha, 4000 ft., *Haarer* no. 972 (K) (achene identical with *Sieber* no. 19; culms sharply 3-angled at apex); papyrus swamp, Kiagwe, Lake Victoria, 3700 ft., *Eggeling* no. 502 (K); Pemba, *Vaughan* no. 681 (K). ANGOLA: Benguella, country of the Ganguellas, *Grosweiler* no. 2767 (K) (culms shining; scales light brown to rose-color, with green center; no bristles). SIERRA LEONE: Mowoto, *Deighton* no. 1687 (K) (specimen young and questionable).

7. *E. LAXIFLORA* (Thwaites) H. Pfeiffer [PL. 537, FIG. 3; MAP 15], Mitt. Inst. Bot. Hamburg vii. 169 (1928). *E. variegata* var. *laxiflora* (Thwaites) C. B. Clarke; SVENSON, RHODORA xxxi. 156 (1929). (?) *E. Graeffiana* Boeckl. Flora lviii. 108 (1875).—INDIA: Silhet, *Hooker & Thomson* (K); Tenasserim & Andamans, hb. *Helfer* no. 6220/1 (K); Malay Peninsula, *Griffith* no. 6229 (K); Singapore, *Hullett* in 1893 (K); *Ridley* no. 5799 (K); *Penang Botanic Gardens* no. 4543 (K); Malacca, *Lemann* in 1845 (K); Ceylon, hb. *Macrae* (K). JAVA: *Zollinger* nos. 266 (K), 291 (Paris, TYPE of *E. ochrostachys* Steud.). BORNEO: Banjarmasin, *Motley* no. 1266 (K); Sarawak, *Beccari* nos. 6 (K) & 3720 (K); *J. & S. Clemens* no. 20825 (NY); Kuching, *Ridley* no. 12347 (K). PHILIPPINE ISLANDS: Tanculan, Mindanao, *Bureau of Science* no. 26129 (NY). SUMATRA: Bila, *Toroës* no. 3027 (NY). FIJI ISLANDS: *Capt. Wilkes* (K) (as *E. Graeffeana*). CAROLINE ISLANDS: Ponape, *Kanehira* nos. 679 (NY), and 1515 (NY); *Ledermann* no. 13657 (K); Yap, *Kanehira* no. 1152 (NY). SOLOMON ISLANDS: chiefly New Georgia, *H. M. S. "Penguin,"* 1894–5 (K). The type of *E. Graeffeana* came from Opolu, Samoa.

8. *E. NUDA* C. B. Clarke [PL. 538, FIG. 4; MAP 12], Kew Bull. Add. Ser. viii. 21 (1908) and Ill. Cyp. t. xxxv. figs. 8–11 (1909). *E. philippinensis* SVENSON, RHODORA xxxi. 155 (1929).—CHINA: Hainan, hb.

Canton Christian College no. 7793 (NY). AUSTRALIA: Buderim, Moreton Dist., Queensland, *S. T. Blake* no. 5227 (B); Cairns, Cook Dist., Queensland, *Blake* nos. 9360 (B) & 9361 (B); Virginia, Brisbane, *Blake* no. 1421 (B); between Norman and Gilbert River, *Gulliver* (K, TYPE).

In this species, as in most others of *Eleocharis*, presence or absence of bristles and direction of teeth are of little importance.

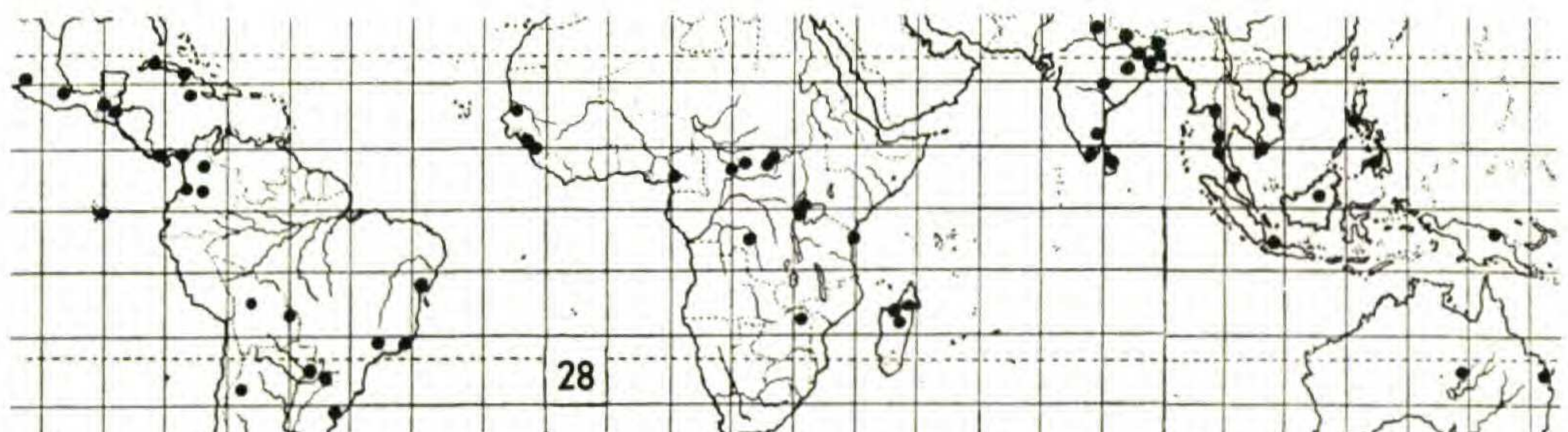
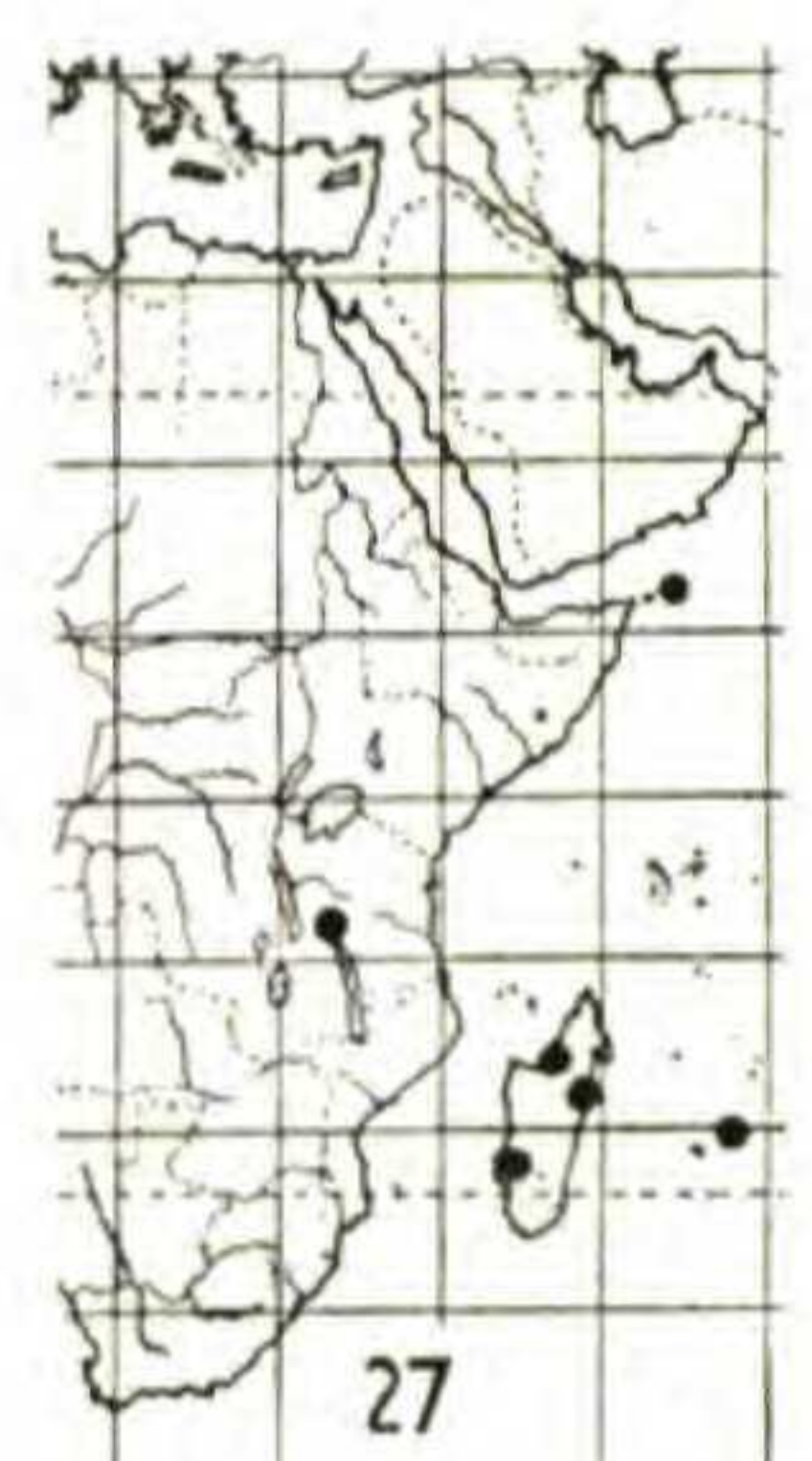
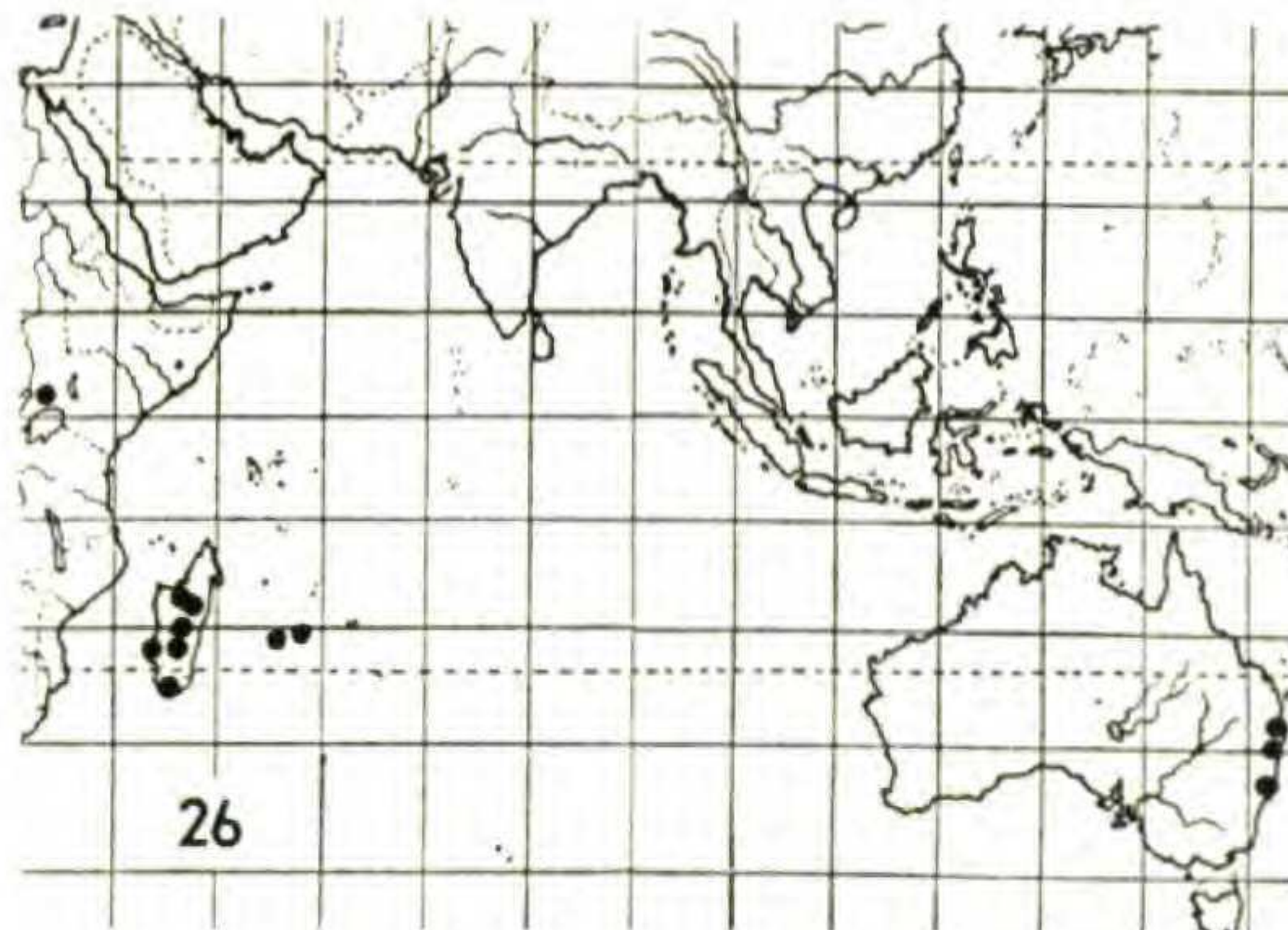
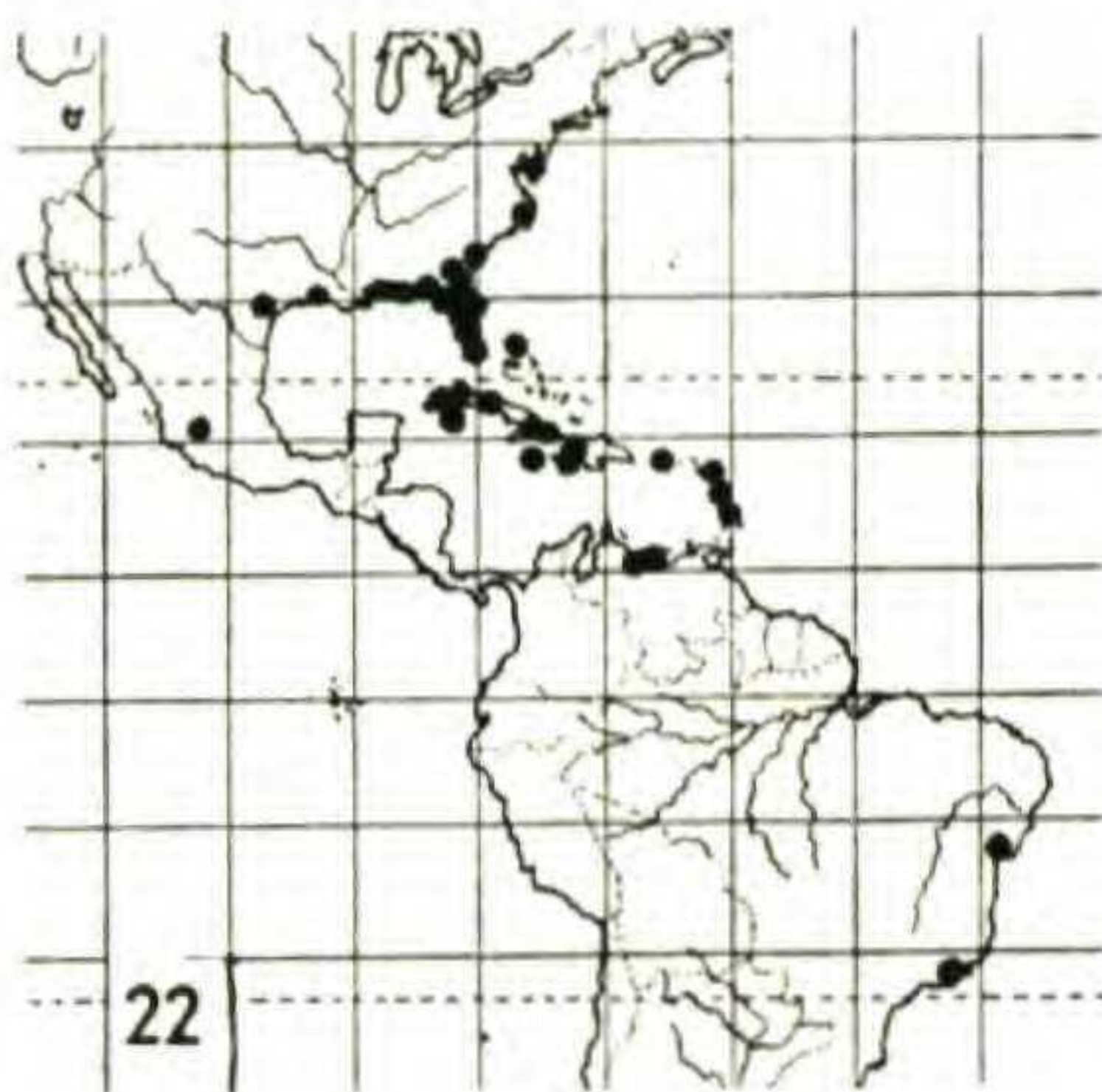
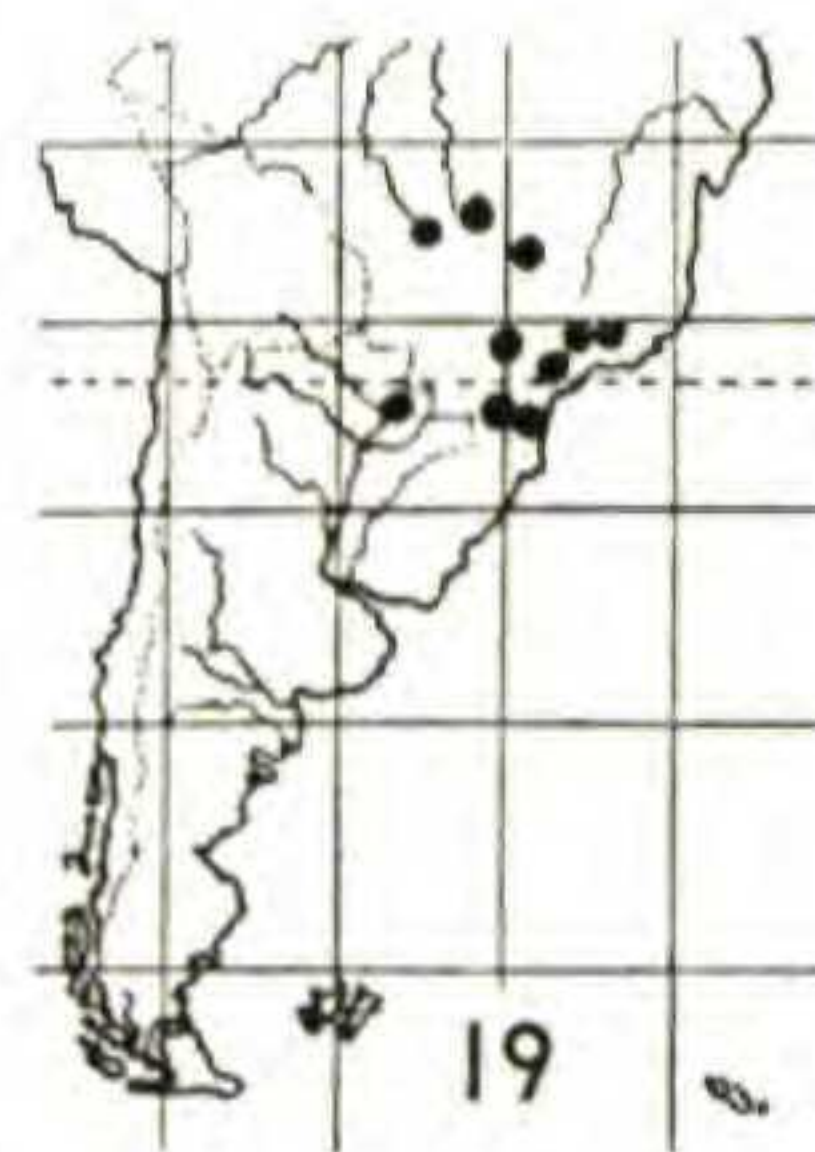
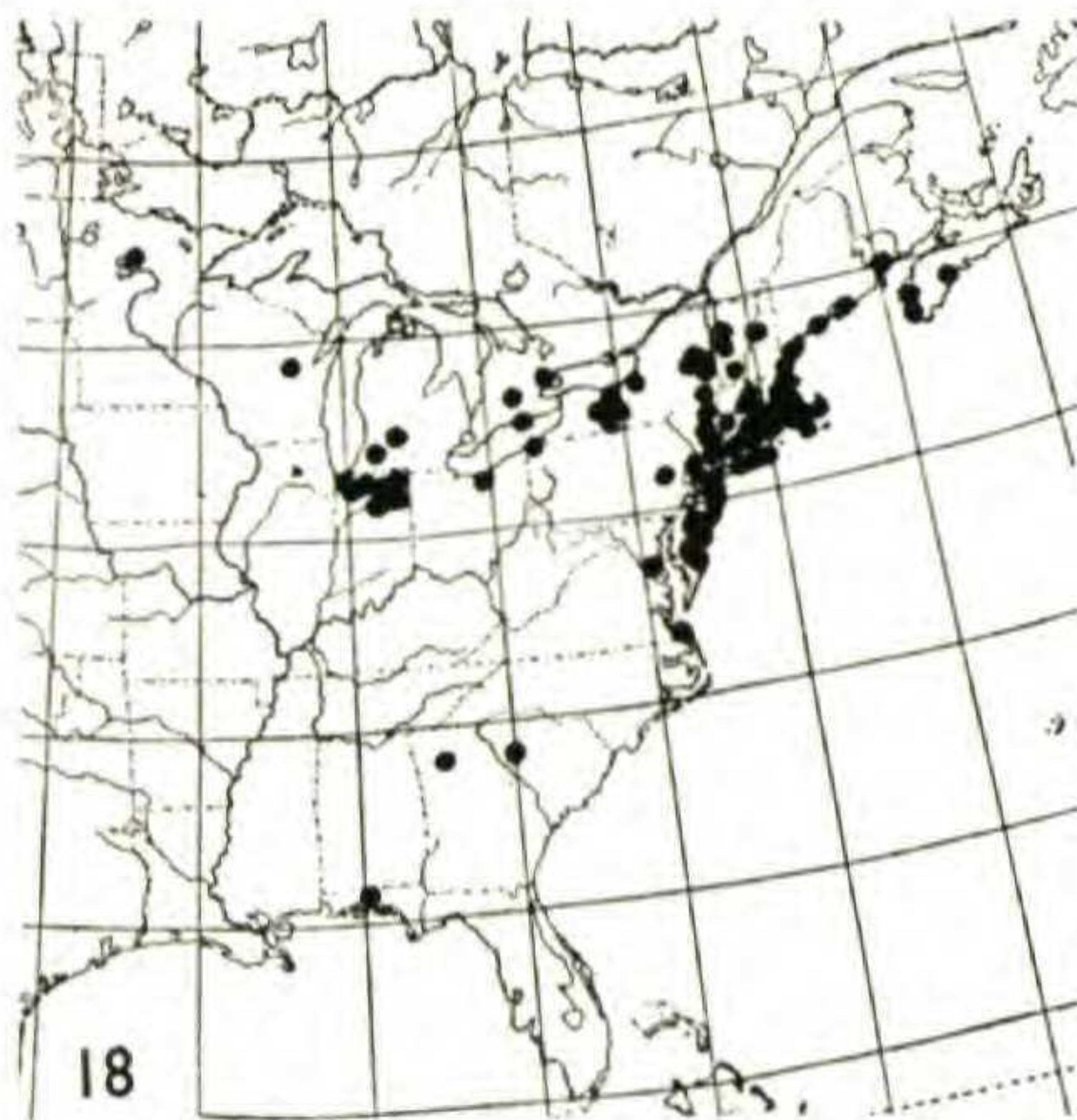
9. *E. CALOCARPA* Chermezon [PL. 537, FIG. 8; MAP 16]. Perennial, culms 3.5–7.5 dm. high, 2–2.5 mm. wide, rigid, quadrangular: spikelets cylindric, subacute, 20–35 cm. long, 3.5 mm. wide: scales lax, 4 mm. long, ovate-lanceolate, obtuse, stramineous-fuscos, sometimes with a reddish margin, striate, convex: stamens 3: style 3-fid: achene biconvex, obovoid, 2 mm. long, orange, with about 12 rows of horizontally-elongated, strongly inflated cells: style-base dark brown, conic, flattened, 0.5 mm. long; bristles light brown, surpassing the achene.—Arch. de Bot. Caen iv. no. 7: 41 (1931). AFRICA: Mangapou [6° N. 23° E.], Haut Oubangui, *Le Testu* no. 3162; King's Lake, Kampala, Uganda, 3900 ft., *Hancock & Chandler* no. 21 (K, B) (det. Chermezon).

var. *NUDA* Chermezon (l. c.). Differs from the type in lack of bristles, and smaller (1.5 mm. long), pale yellow achenes.—Moroubas, Haut Oubangui, *Tisserant* no. 1186; Masaka District, 3800 ft., Uganda, *Chandler* no. 1393 (K, B) (culms terete).

E. calocarpa and *E. variegata* appear to be very closely related. The achenes have the same type of inflated surface cells, approached nowhere else in the genus except in the Caribbean *E. cellulosa*. Except for color of achenes, the chief distinction seems to lie in the 4-angled culms of *E. calocarpa* as compared with the cylindric culms of *E. variegata*. Similar cylindric culms are characteristic of *E. cellulosa*, but sharply-angled culms are occasional. The absolute specific value of the angled culm is therefore open to question.

10. *E. SPIRALIS* (Rottb.) R. & S. [MAP 17]; Svenson, RHODORA xxxi. 135 (1929). *E. compacta* R. Br. Prod. 224 (1810). *Scirpus compactus* Poir. Encyc. Suppl. v. 102 (1817); Spreng. Syst. 1. 203 (1825). *E. austro-caledonica* Vieillard, Ann. Sci. Nat. Bot. ser. 4, xvi. 38 (1862).—Mauritius, Madagascar and the Orient. MAURITIUS: *Bouton* no. 3 (K). MADAGASCAR: marais saumâtres, baie de Bombetoka,¹ *Perrier de la Bâthie* no. 2498 (B). CHINA: in water near the sea, Hainan, *Liang* no. 66592 (NY). INDIA: East Bengal, *Griffith* no. 6231 (K); in subsalsis uliginosis insulae Salsette, *Jacquemont* no. 446 (K); Burma, *Griffith* (K); Bengal, *Lehmann* in 1845 (K); Bombay, *Lisboa* (?) (K); Tranquebar, *Rottler* in 1798 (K); Pondicherry, *Meebold* no.

¹ Professor Chermezon has informed me that this is the only station known in Madagascar and that the plant is perhaps an introduction.



MAPS 18-28. Map of *ELEOCHARIS*, 18, *OLIVACEA*; 19, *CAPILLACEA*; 20, *FUSCO-PURPUREA*; 21, *SELLOWIANA*; 22, *FLAVESCENS*; 23, *SCHAFFNERI*; 24, *SINTENISII*; 25, *MACULOSA*; 26, *MINUTA*; 27, *INTRICATA*; 28, *FISTULOSA*.

2539 (K); CEYLON: *Thwaites* (K). PHILIPPINE IDS.: Manila, *Merrill* no. 9788 (NY). NEW CALEDONIA: *Paucher* (K); eaux sumâtres, *Vieillard* no. 1453 (K, COTYPE of *E. austro-caledonica*). AUSTRALIA: Arnhem, South Bay, *R. Brown* (K); north coast, *R. Brown* no. 5934 (Br. Mus., TYPE of *E. compacta*); Gladstone, Queensland, *S. T. Blake* no. 12790 (B). The species is also represented in the Willdenow Herbarium, no. 1195, fol. 1, *Roestl* (without locality).

11. *E. INTERSTINCTA* (Vahl) R. & S. [MAP 13]; Svenson, RHODORA xxxi. 130 (1929). *Limnochloa obsoleta* Nees in Martius, Fl. Bras. ii¹. 100 (1842). *E. obsoleta* Steud. Syn. Cyp. 81 (1855). *E. cognata* Steud. Syn. Cyp. 81 (1855) [Guiana], e. desc. Additional noteworthy citations: FLORIDA: La Belle, Hendry Co., *F. M. Uhler & C. F. Smith* in 1937 (B). TEXAS: Neuces River, Uvalde Co., *E. J. Palmer* no. 14518 (B). BOLIVIA: 500 m., Buena Vista, Santa Cruz, *Steinbach* no. 5216 (G).

12. *E. EQUISETOIDES* (Ell.) Torr. [MAP 5]; Svenson, RHODORA xxxi. 131 (1929). Additional citations: NEW YORK: Mendon Pond, Monroe Co., *Mathews* in 1920 (Alb). DELAWARE: near Lewiston, *Nuttall* (NY). MICHIGAN: White Lake, Kalamazoo Co., *Hanes* no. 1377 (B); Sand Lake, Jackson Co., *J. Wright* (NY); Portage Lake, Jackson Co., hb. *S. H. Camp* no. 11434 (NY). INDIANA: Hunter Lake, Elkhart Co., *Deam* no. 52342 (B); North Twin Lake, Lagrange Co., *Deam* no. 52436 (B). WISCONSIN: Madison (coll. unknown) (G). MISSISSIPPI: Woolmarket, *Tracy* no. 3224 (NY); Ocean Springs, *Tracy* no. 91 (NY).

13. *E. DULCIS* (Burm. f.) Trinius [PL. 537, FIG. 6]; Svenson, RHODORA xxxi. 158 (1929). *E. equisetina* Presl; Svenson, RHODORA xxxi. 161 (1929). *E. plantaginoides* (Retz.) Domin, Bibl. Bot. xx. 445 (1915).

This widespread, cultivated oriental species, the Chinese water-chestnut, has appeared in West Africa (cf. Hutchinson & Dalziel, l. c., as *E. plantaginea*). Photographs of Presl's type of *E. equisetina*, which Dr. Malkovsky has most kindly sent me from the National Museum of Praha, show that it is a slender phase of *E. dulcis*. A specimen from the vicinity of Daru Island, British New Guinea, *Brass* no. 6064 (NY) has the robust character of *E. sphacelata*, associated with achenes typical of *E. dulcis*. Possibly it represents a transition between the two species.

14. *E. SPHACELATA* R. Br.; Svenson, RHODORA xxxi. 160 (1929).

15. *E. ROBBINSII* Oakes [MAP 3]; Svenson, RHODORA xxxi. 154 (1929).

Specimens possibly from the TYPE collection, labelled "White Mts. of N. Hampshire, cl. Oakes legit" are at the Brooklyn Botanic Garden, originating from the herbarium of C. F. Austin. The northernmost collection of *E. Robbinsii* seems to be W. R. Watson's no. 442 (Can) from the Timagami Forest Reserve, Ontario.

MUTATAE: KEY TO THE SLENDER SOUTH AMERICAN SPECIES

- Achenes trigonous; 1–1.5 mm. long (including style-base) *E. elongata*.
 Achenes biconvex; 2–4 mm. long (including style-base)
 Achene constricted into a neck below style-base
 Style-base trilobed *E. mitrata*.
 Style-base not trilobed *E. Jelskiana*.
 Achene not constricted *E. plicarhachis*.

16. *E. ELONGATA* Chapman [PL. 537, FIG. 2; MAP 14]; Svenson, RHODORA xxxi. 155 (1929).—*E. elongata* has the smallest achenes in the group, the body being only 1.0–1.2 mm. long. Further citations: FLORIDA: Appalachicola, Chapman (NY). ALABAMA: Point Clear, Mohr in 1866 (NY). Here belong also two specimens from BRAZIL: Rio de Janeiro, Glaziou nos. 9338 & 6430 (K), as *E. elata*.

On No. 9338 Clarke has commented “a startling plant to me. The nut nearly as that of *acicularis*.”

Also at Kew there is a collection from Sao Paulo (*Usteri* no. 24c) labeled as *E. elata*. It resembles *E. Robbinsii*, but has almost cylindric culms and spreading scales. The achene-body is 3 mm. long with about 20 rows of indistinct markings on each face (much as in *E. elongata*), constricted above as in *E. Sagotii*, with a dark brown style-base 1 mm. long, and bristles exceeding the achene. Judging from description, it is probably *E. BRASILIENSIS* Boeckl. (cf. Svenson, RHODORA xxxi. 162 (1929)).

17. *E. MITRATA* (Griseb.) C. B. Clarke [PL. 537, FIG. 5; MAP 8]. *Scirpus mitratus* Grisebach, Fl. Br. W. I. 570 (1864).—TRINIDAD: Savana Tiareo, July 2, 1848, Crueger (COTYPE, K). SAN DOMINGO: Sabana de la Mar, Cordillera Central, Ekman no. 15611 (S). FRENCH GUIANA: Cayenne, Jelski (Berlin, in part). BRAZIL: vic. Barra [Manaos], prov. Rio Negro, Dec.–Mar. 1850–51, Spruce (K); Campo de Jauauari, Jan. 1851, Spruce no. 1289 (K).

E. mitrata, close to *E. plicarhachis* in appearance, has larger spikelets with obtuse thickened scales, and achenes 2.0 mm. long, including the blunt, usually tricuspidate, style-base which is 0.5 mm. long.

18. *E. JELSKIANA* Boeckl. Linnaea xxxviii. 376 (1874) [MAP 7]. *E. Sagotii* C. B. Clarke, Kew Bull. Add. Ser. viii. 20 (1908); Uttien in Pulle, Fl. Surinam i. 111 (1934).—FRENCH GUIANA: Cayenne, Jelski (Berlin, COTYPE of *E. Jelskiana*); Cayenne, Sagot no. 1390 (K, TYPE of *E. Sagotii*). COLOMBIA: Polonia, Santander, 100 m., Killip & Smith no. 14914 (NY). PERU: Tarapoto, Spruce no. 4284 (K, TYPE of *E. Peruviana*¹) and no. 4282 (K, NY).

The collection of *E. Jelskiana* at Berlin is mixed with *E. mitrata*, but from Boeckeler's description, the elements are separable. *E.*

¹ Kew Bull. Add. Ser. viii. 105 (1908) (nomen).

Jelskiana has cylindric slender culms (0.5–1.0 mm. wide), narrow spikelets not exceeding 2.5 mm. wide, and green appressed linear scales with darkened margins. The dull black achene (2 mm. long) has about 12 rows of poorly-defined hexagonal cells, the apex constricted below the conical style-base. The type of *E. Sagotii* is similar, except that the achenes are immature and yellowish.

19. *E. PLICARHACHIS* (Griseb.) Svenson [PL. 537, FIG. 1; MAP 9]; RHODORA xxxi. 158 (1929). *E. elata* Boeckl. *E. Sagotii* var. *glochidiata* C. B. Clarke, Kew Bull. Add. Ser. viii. 21 (1908).—CUBA: Pinar del Rio, *C. Wright* no. 3372 (NY); Mordazo, Santa Clara, *León & Cazanes* no. 5980 (NY). MEXICO: Tabasco, *Rovirosa* no. 438 (NY). PANAMA: Frijoles (Canal Zone), *Svenson* no. 433 (B). BRITISH GUIANA: *Jenman* no. 6111 (K (TYPE of *E. Sagotii* var. *glochidiata*), NY); Moruka River, Pomeroon Distr., *De La Cruz* no. 993 (NY); Wanama River, Northwest Distr., *De La Cruz* no. 4003 (NY). VENEZUELA: Maracaibo, *Merkel* (Cop, TYPE of *E. elata*). COLOMBIA: Puerto Berrio, Dept. Antioquia, *Pennell* nos. 3727 (NY); 3733 (NY). PERU: Yurimaguas, Dept. Loreto, alt. 125 m., *Killip & Smith* no. 27962 (NY, US). BRAZIL: Fazenda de Sta. Cruz, *Glaziou* 9338 (Paris, as *E. variegata*). PARAGUAY: Ipacaray, *Hassler* no. 12570 (G, K).

The type of *E. elata* consists of two very old sheets from Horne-mann's herbarium, collected in Maracaibo. They show no indication of Brazilian origin.

Series 2: PAUCIFLORAE

[For nos. 20–24 see index to species, and RHODORA xxxvi. 377–389 (1934)].

25. *E. MELANOMPHALA* C. B. Clarke [PL. 539, FIG. 4]. Perennial with a lignescent base; culms inflated and spongy, 10–16 cm. long, 1 mm. wide; sheaths loose, stramineous, purplish at the base and at the obtuse oblique apex: spikelets ovoid, 5–6 mm. long, loosely 5–10-flowered: scales lustrous brown, obtuse to subacute, the lowermost with a broad greenish keel: stamens 3, anthers 1.5 mm. long: style 3-fid: achene broadly ovoid, 2.0 mm. high, 1.5 mm. wide, bluntly trigonous, stramineous, lustrous, with minute quadrangular-to-hexagonal reticulation: style-base small, black, short-pyramidal, not constricted at the base: bristles dark brown, half as long as the achene or rudimentary.—Engler, Bot. Jahrb. xxx. Beibl. 68: 24 (1901); Barros, Mus. Hist. Nat. Buenos Aires xxxiv. 468, fig. 21 (1928); Svenson, RHODORA xxxvi. 383 (1934).

The illustration from the COTYPE at the New York Botanical Garden has been added in order to round out the treatment of the

Pauciflorae. *E. melanomphala* represents the extreme of the *E. pauciflora* complex in South America, being characterized by unusual width of achene, and by the peculiar style-base. Since only a single collection is known, its articulation with *E. atacamensis*¹ is obscure.

Series 3: ACICULARES

One way to treat this group is to place everything under *E. acicularis*, as many recent authors have done. No further discrimination is then required. Personally, I feel that the name *E. acicularis* should be restricted to slender plants of holarctic distribution, and that the plants of Mexico and the southern hemisphere (except for some obviously introduced examples in Australia) do not belong under *E. acicularis*. The dwarf alpine plants of the Andes and Mexico have been the greatest source of trouble, but after a considerable amount of boiling and dissecting, a fairly satisfactory conclusion has been reached, although I do not yet understand where *E. bonariensis* begins either in South America or in Mexico. The high Andean material (*E. exigua*), as Kunth observed in 1837, has two stamens instead of three (cf. pl. 539, fig. 9c) with anthers much reduced in size; the bristles when present are coarser than in *E. acicularis*. These characters hold well in the material which I have examined, to which may be added the fact that the Andean material has a totally different appearance than the European. *E. radicans* (*E. Lindheimeri*), *E. cancellata*, and *E. bella* also have consistently *two* stamens; other species of the *Aciculares* (perhaps excepting *E. brachycarpa* which I have not recently examined) have *three*. In the accompanying map of the *Aciculares* (MAP 1), the limits of distribution in Eurasia (*E. acicularis*) have been worked out from various floras. It is probable that *E. acicularis* does not occur throughout the interior of the Scandinavian peninsula. Also, despite reports, the group is probably absent through much of Patagonia. The link which I have shown connecting Colombia and Mexico is generalized, and represented by only one or two collections.

26. *E. EXIGUA* (HBK) R. & S. [PL. 539, FIGS. 5, 9c]. MAP 54. Dwarf plants with extensive filiform creeping rootstocks; culms 2–10 cm. high, capillary, frequently rigid and recurved, variously-angled: sheaths scarious, often dilated or emarginate at the apex: spikelets 2–3 mm. long. ovate to linear, 3–8 flowered: scales obtuse or acute, obri-

¹ Treated by me under *E. pauciflora* (l. c.), of which it forms a fairly well-marked variety.

ously striate, green, sometimes with broad purple margins: *stamens* 2; *anthers* 0.5 mm. long, constricted at apex: achenes 1 mm. long, oblong-obovate, yellowish-green, obscurely trigonous with the intermediate longitudinal ribs frequently elevated, about 40-trabeculate in each longitudinal series: style-base usually acute: bristles 2, white, often absent.—Syst. ii. 154 (1817). *Scirpus exiguus* HBK. Nov. Gen. et Sp. i. 225 (1816). *E. costulata* sensu Svenson, RHODORA xxxi. 204, not Nees & Meyen. *E. rivularis* Phil. Linnaea xxxiii. 270 (1864–65); Boeck. Linnaea xxxvi. 427 (1869–70).—COLOMBIA: in monte Quindiu [Central Cordillera, 5° N.] (Berlin, TYPE of *Scirpus exiguus*); Bogota, Lindig no. 1425 (K); Bogota, “alt. 2650, Nov. 1855,” Triana no. 430 (K, US). ECUADOR: Mt. Chimborazo, 2680 m., André no. 4272 (K); Huigra, Prov. Chimborazo, 1200 m., A. S. Hitchcock no. 20352 (NY) and Rose no. 22415 (NY); Quito, Jameson (K) and Spruce no. 5206 (K); Riobamba, Mille no. 338 (NY). BOLIVIA: Comarapa, Dept. Cochabamba, Steinbach no. 8521 (NY). CHILE: Cuming (K); Valparaiso, Jaffuel no. 759 (G); Concepcion, Jaffuel no. 2955 (G).

The type of *Scirpus exiguus* (hb. Willdenow no. 1168) is a poor and sprawling specimen with flaccid culms, 5–6-flowered spikelets (3 mm. long) with divergent purplish-banded scales, and rather broad achenes with short conical style-base. Jaffuel's specimens from Chile, with black spikelets and two stamens with anthers 0.5–0.7 mm. long, conform to the description of *E. rivularis*. Philippi's type of *E. rivularis* came from the Aconagua River near S. Rafael.

27. *E. RADICANS* (Poir.) Kunth, Enum. ii. 142 (1837) [PL. 539, FIG. 9a; MAP 61]. *Scirpus radicans* Poir. Encyc. vi. 751 (1804). *Eleogiton radicans* A. Dietrich, Sp. Pl. ii. 97 (1833). *Eleocharis costulata* Nees & Meyen ex Kunth, Enum. ii. 142 (1837); (?) Desvaux in C. Gay, Fl. Chil. vi. 172 (1853), not Svenson, RHODORA xxxi. 204 (1929). *Chaetocyperus costulatus* Nees & Meyen (1842); (RHODORA, l. c.). *E. Lindheimeri* (Clarke) Svenson, RHODORA xxxi. 199 (1929).—PORTO RICO: Ledru (TYPE not seen). HAITI: Furcy, 1300 m., Leonard no. 4812 (NY). SANTO DOMINGO: Cordillera Central (2500 m.), Ekman nos. 14130 (S) & 13650 (S); Sierra de Ocoa, Ekman no. 11936 (S); Santiago, Ekman no. 16534 (S). PERU: Dombey in 1829 (Berlin). CHILE: Cordillera de St. Fernando, Meyen in 1831 (TYPE of *Ch. costulatus*), dwarf plants 3 cm. high (Berlin); Valdivia, Philippi (K); Valparaiso, A. Pirion no. 757 (in part) (G). ARGENTINA: Sierra Achala, Cordoba, Hieronymus no. 642 (Berlin, K) (a large form with culms to 10 cm.; no bristles); Tucuman, Hieronymus & Lorentz no. 1074 (Berlin); Catamarca, H. & L. nos. 434, 474 (Berlin); Tucuman, Dept. Alta Cruz, Venturi no. 2283 (US, B) & Dept. Leales, Venturi no. 597 (US, B); Jujuy, Dept. San Pedro, Venturi no. 9643 (NY); Posados, Misiones, Ekman no. 1244 (NY). URUGUAY: Dept. Canelones, Osten no. 21635 (B); Montevideo, in paludosis dunarum, Osten no.

22515 (B) (dwarf rigid form, issued as *E. acicularis* var. *lilliputiana*); Bañados, Lorentz no. 453 (K, as *E. retroflexa*).

E. radicans is the only member of the *Aciculares* known from the West Indies, and there only in Porto Rico and Haiti. In North America it is sporadic (see Professor Fernald's map in RHODORA xxxix. 483 (1937)); but in Argentina apparently not uncommon, though until recently I had seen no specimens. The stamens are 0.3–0.5 mm. long and sometimes mucronate as in Desvaux's illustration, which is perhaps correctly referred to *C. radicans* by Clarke (Engler, Bot. Jahrb. xxx. Beibl. 68: 22 (1901)). The bristles are often short or entirely lacking.

28. *E. BONARIENSIS* Nees in Hook. Journ. Bot. ii. 398 (1840) [MAP 59]; Svenson, RHODORA xxxi. 202 (1929). *Chaetocyperus bonariensis* Nees in Martius, Fl. Bras. ii¹. 96 (1842). *C. obtusatus* Nees (l. c.) p. 94; Steud. Syn. Cyp. 73 (1855). *E. aciculariformis* Greenman, Proc. Am. Acad. xxxiv. 566 (1899); Svenson, RHODORA xxxi. 202 (1929). *E. acicularis* subsp. *bonariensis* Osten, Anales Mus. Hist. Nat. Montevideo, ser. 2a, iii. 173 (1936).

The European *E. acicularis* (cf. PL. 539, FIG. 1) has, in general, dwarfed capillary culms, fragile, non-costulate elongate achenes, 1 mm. long, with a small acicular style-base. The TYPE of *E. bonariensis* (hb. Lindley, Cambridge) is a small plant with rather coarse rhizome and purplish scales, but the species varies greatly in size. Tweedie's plant at Kew has filiform culms up to 37 cm. long, and somewhat distichous spikelets with blunt, yellowish-green, slightly erose scales, and with a firm incurved sheath-apex, resembling a quill pen. *E. squamata* Boeckl. Cyp. Nov. ii. 11 (1890) was based on young material (hb. Berlin) collected in Minas Geraes by Schenck. The numerous culms are only 6 cm. high, sheaths somewhat inflated but not mucronate, and scales much as in typical *E. tenuis*. It is possibly a juvenile collection of what I have called *E. squamigera*, but does not belong with *E. bonariensis* (cf. Barros, op. cit. p. 450). The type collection of *Ch. obtusatus* (Berlin, hb. Nees no. 1722) is an immature, dwarf (7 cm. high) specimen of *E. bonariensis*, with fan-shaped obtuse lower scales.

E. striatula Desv. has been included by Clarke under *E. bonariensis* (Engler, Bot. Jahrb. xxx. Beibl. 68: 22 (1901)) and this treatment is substantiated by Gay's illustration and Desvaux's specimens at Paris and at Kew. The spikelets are approximately 15-flowered, with brown-rimmed, obtuse scales; the achenes measure slightly over 1.0 mm. long, with blunt enlarged tubercles. In large Mexican specimens of the *Aciculares*, the scarious character of sheaths is inconstant.

E. aciculariformis should be treated as a synonym of *E. BONARIENSIS*, with the additional MEXICAN citations: Durango, *E. Palmer* no. 386 in 1896 (NY); Valle de Mexico, *Schaffner* no. 21 (NY) (as *E. striatula*). Additional citations for *E. bonariensis*: BRAZIL: Rio Grande do Sul, *Schwarzer* in 1899 (S). ARGENTINA: Cordoba, *Kurtz* no. 6635 (NY) and *O. Kuntze* no. 36 (NY); also *Stuckert* nos. 241 (K), 7614 (K); La Cumbre, 1200 m., *Barros* no. 1743 (B); Chicligasta, Tucuman, *Lillo* nos. 15542 (B), 15538 (B); Buenos Aires, *Barros* nos. 124 (B), 226 (B); Palermo, Capital Federal, *Barros* nos. 58 (B), 631 (B), 640 (B); Salta, *O. Kuntze* no. 35 (NY). URUGUAY: Canelones, *Osten* no. 20070 (B); Maldonado, locis humidis in dunis, *Osten* no. 22686 (B); Carrasco, Montevideo, *Osten* no. 22304 (B); San José, *Osten* no. 22715 (B). PARAGUAY: Rica, *Joergensen* no. 3581 (US, B); Asuncion, *Morong* no. 87 (NY). CHILE: Rancagua, *Bertero* no. 613 (NY); Talcahuano, Concepcion, *Skottsberg* no. 1167 (NY).

29. *E. STENOCARPA* Svenson [MAP 56], RHODORA xxxi. 205 (1929).—Additional citations: VENEZUELA: San Rafael, Mérida, *Pittier* nos. 12895 (NY) & 13218 (NY). COLOMBIA: Paramo de Romeral, Santander, 3800–4100 m., *Killip & Smith* no. 18520 (NY).

30. *E. NERVATA* Svenson [MAP 60], RHODORA xxxi. 204 (1929). *Chaetocyperus radicans* Steud. Syn. Cyp. 74 (1855). *Heleocharis radicans* (Steud.) Hemsley, Biol. Cent.-Am. Bot. iii. 456 (1885), not R. & S. *H. acicularis* Hemsley, (op. cit.) iii. 454 (1885) (partim). Previous citations from Ecuador should be excluded and the following added: MEXICO: Oaxaca, 8–9000 ft., *Galeotti* no. 5748 (K, COTYPE of *Ch. radicans*); in summo Monte San Felipe, ubi glacier apotheca, Oaxaca, *Andrieux* no. 49 (K) (NY?); Eugenio, Orizaba, *F. Mueller* no. 1973 (Sept. 1853) (NY); *Mueller* (sine loc.) no. 1975 (NY). GUATEMALA: Santa Elena, Chimaltenango, 2400–2700 m., *Skutch* no. 429 (NY, US). Boeckeler's specimen of *E. triflora* at Berlin is *E. nervata*; the TYPE at Copenhagen is *E. parvula* var. *anachaeta*.

The small alpine Mexican plants passing as *E. acicularis* have three stamens with anthers rather consistently 0.7 mm. long. Very likely a transition occurs between the smaller plants of *E. aciculariformis* and the type of *E. nervata* (similar to Skutch's collection), thence to dwarf, capillary material such as the type of *Chaetocyperus radicans*, with achenes often only 1.0 mm. long. *C. radicans* was described quite independently of *Eleocharis radicans* (HBK) R. & S.

31. *E. BRACHYCARPA* Svenson, RHODORA xxxi. 200 (1929).

32. *E. CANCELLATA* S. Wats.; Svenson, RHODORA xxxi. 200 (1929).

It is not certain that the Mexican Boundary Survey actually collected this species in New Mexico, since they also visited Sonora, from which there is a collection June, 1851, *Thurber* (NY).

33. *E. BELLA* (Piper) Svenson [MAP 53], RHODORA xxxi. 201 (1929).

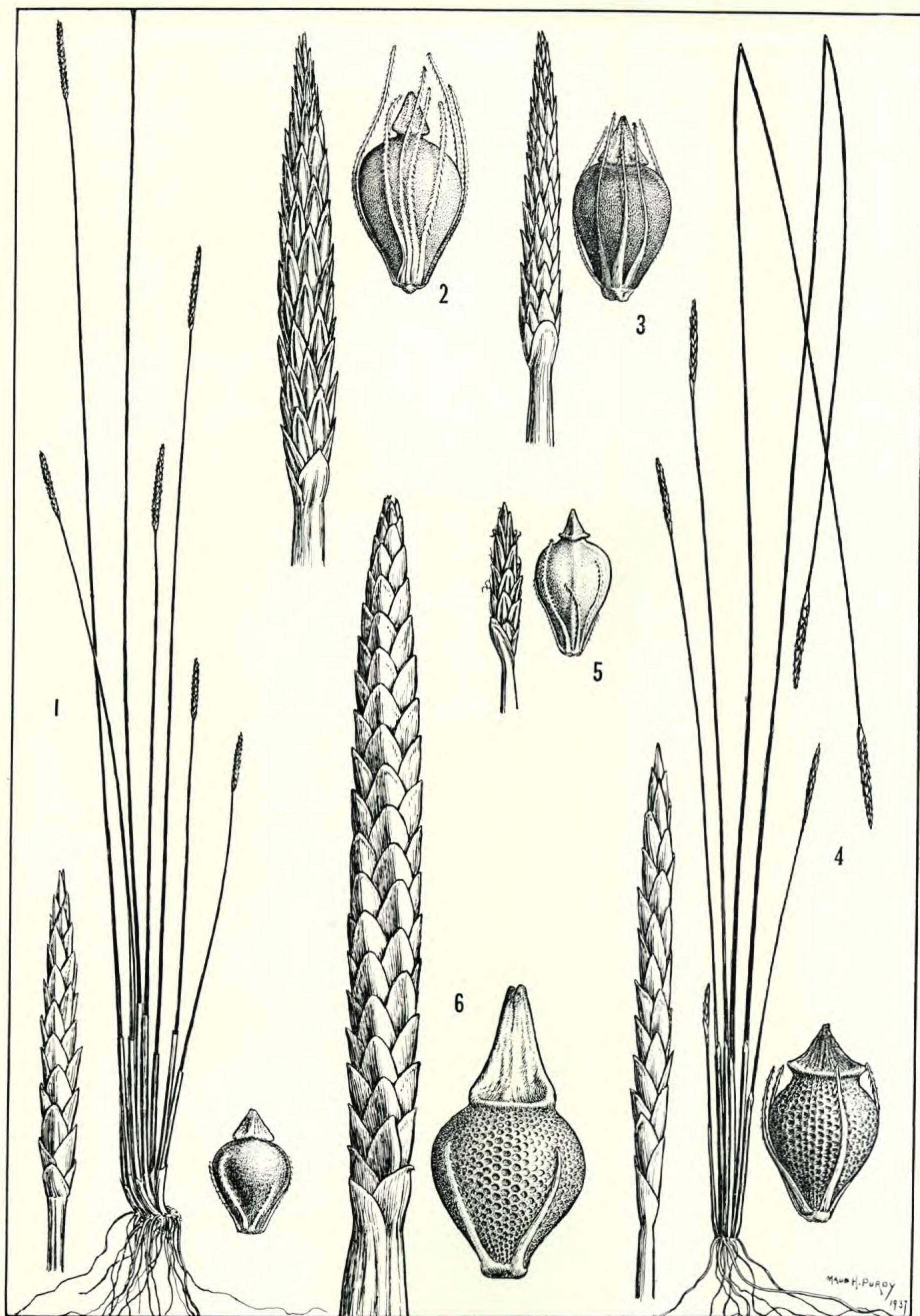
Additional citations: WASHINGTON: Klickitat Co., *Suksdorf* no. 588 (NY). OREGON: Crow Creek, Wallowa Co., alt. 4425 ft., *E. P. Sheldon* no. 8506 (NY). NEVADA: Truckee River bottom, Glendale, *Hillman* in 1894 (NY). CALIFORNIA: Moulton, Warner Mts. [Modoc Co.], *Griffiths & Hunter* no. 478 (NY); near Calaveras Big Trees, *Dudley* in 1906 (NY); Mt. Shasta, *H. E. Brown* no. 543 (NY); Jonesville, Butte Co., *Copeland* no. 344a (NY). MONTANA: Lola Hot Springs, *J. E. Kirkwood* no. 1548 (hb. Oberlin Coll.), a noteworthy range extension.

34. *E. REVERCHONII* Svenson [MAP 57], RHODORA xxxi. 203 (1929).—Additional citations: TEXAS: San Diego, *Nealley* in 1893 (NY); "Hogbed prairie," *C. Wright* no. 512 (NY); prairie near Indianola [Port Lavaca], *Ravenel* no. 96, May 3, 1869 (NY); San Antonio, *C. R. Ball* no. 947 (NY); Valley of the Lower Rio Grande, *Buckley* (NY).

Examination of better material shows that mature achenes average 0.7 mm. long and the three stamens have anthers 0.7–1.0 mm. long. The style-base is blunt and rounded. *Nealley's* collection is perhaps most representative of the species, having a long rhizome with isolated tufts of culms which are 2–6 cm. high; therefore much shorter than the elongated form originally described.

35. *E. WOLFII* A. Gray [MAP 58]; Svenson, RHODORA xxxi. 201 (1929).—Added citations: NEW YORK: Train's meadow swamp, Woodford, Long Island, *Ferguson* in 1927 (NY) (station now destroyed). TENNESSEE: French Broad River, *Buckley* (NY). LOUISIANA: Jackson, East Feliciana, *Carpenter* in 1837 (NY) (cited as *E. compressa*). COLORADO: Black Forest, El Paso Co., *J. H. Christ* no. 1029 (Cornell). ASSINABOIA: Crane Lake, *Macoun* no. 7548 (NY).

36. *E. ACICULARIS* (L.) R. & S. [PL. 539, FIGS. 1, 9b; MAP 55]; Svenson, RHODORA xxxi. 184 (1929). (?) *Scirpus yokoscensis* Fr. & Savat. Enum. Pl. Jap. ii. 543 (1879). *E. comosa* C. Richt. Pl. Europ. i. 143 (1890).—Additional citations (showing limits of known range in America): GREENLAND: 68°–72° N., cf. *Porsild*, Meddel. Groenl. Bd. 93, no. 3: 33 (1935). LABRADOR: Nascaupsee River, Hamilton Inlet, cf. *Wetmore*, RHODORA xxv. 5 (1923). ONTARIO: James Bay, *Macoun* in 1904 (NY); Moose Factory, James Bay, *Spreadborough* no. 62669 (Can); Timagami Forest Reserve, *W. R. Watson* nos. 370 (Can), 455 (Can). MANITOBA: Rapid City, *Macoun* no. 16359 (Can). ALBERTA: Forestburg, *E. H. Moss* no. 1452 (Kew); Crows Nest Pass, Rocky Mts., *Macoun* no. 23174 (Can). SASKATCHEWAN: Cumberland House, *Richardson* (NY). OKLAHOMA: Coal Creek Camp [Le Flore Co.], *Bigelow* in 1853 (NY). ALASKA: Fairbanks, *J. P. Anderson* no. 1495 (NY); Bonanza Creek, Yukon, *Macoun* in 1902 (NY). FLORIDA: Lake Jackson [Tallahassee Co.], *Spury* no. 544 (US). NORTH CAROLINA: Raleigh, *Blomquist* no. 5556 (Duke); Yadkin River, Davidson County, *Blomquist* no. 5557 (Duke). GEORGIA: Princeton,



ELEOCHARIS (habit $\times \frac{1}{2}$, spikelets $\times 2$, achenes $\times 10$). FIG. 1, *E. PALLENS*. FIG. 2, *E. ACUTA*. FIG. 3, *E. PLANA*. FIG. 4, *E. NUDA*. FIG. 5, *E. DIETRICHIANA*. FIG. 6, *E. BRASSII*.